

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNITED STATES OF AMERICA,)
)
 Plaintiff,)
)
 vs.) No. 78 C 1004
)
OUTBOARD MARINE CORPORATION)
AND MONSANTO COMPANY,)
)
 Defendants.)

The deposition of DR. WILLIAM R.
RICHARD, JR., called by the Plaintiff for examination,
pursuant to notice and pursuant to the Rules of Civil
Procedure for the United States District Courts per-
taining to the taking of depositions, taken before
Thea L. Urban, a Notary Public in and for the County
of Cook, State of Illinois, and a Certified Short-
hand Reporter of said State, at the offices of
Kirkland & Ellis, 200 East Randolph Drive, Chicago,
Illinois 60601, on the 15th day of January, A.D.
1981, commencing at 10:00 o'clock a.m.

PRESENT:

MS. ELIZABETH STEIN,
(Pollution Control Section
Land & Natural Resources Division
Department of Justice
Washington, D.C. 20530),

and

Thea L. Urban
Certified Shorthand Reporter
134 South La Salle Street
Chicago, Illinois 60603

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From the desk of: Anne-Marie Kienker

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DAVID M. MOORE, II

PRESENT: (Continued)

MS. M. KAYE JACOBS and
MR. GEORGE PHELUS,
(Water Enforcement Division
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604),

appeared on behalf of the United
States of America;

MS. ROSEANN OLIVER,
(Phelan, Pope & John, Ltd.
30 North LaSalle Street
Chicago, Illinois 60603),

and

MS. JOANNA NEW,
(Martin, Craig, Chester & Sonnenschein
115 South LaSalle Street
Chicago, Illinois 60603),

appeared on behalf of Outboard Marine
Corporation;

MR. JAMES H. SCHINK and MR. ROBERT SHAPIRO,
(Kirkland & Ellis
200 East Randolph Drive
Chicago, Illinois 60601),

appeared on behalf of Monsanto Company.

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I N D E XWITNESS:DirectCrossRedirectRecross

WILLIAM R. RICHARD, JR.

By Ms. Stein

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E X H I B I T S

Richard-Plaintiff Deposition

ExhibitMarked for ID

No. 1	100
No. 2	171
No. 3	174
No. 4	177
No. 5	187
No. 6	188
No. 7	189
No. 8	196

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MS. STEIN: Are you ready?

MR. SCHINK: Any time.

MS. STEIN: Would you swear the witness, please.

(Witness sworn.)

MS. STEIN: Let the record reflect we are taking this deposition pursuant to notice and we will be going until completed, isn't that correct?

MR. SCHINK: Based on your representation that we can do it in a couple of days or less, yes.

MS. STEIN: All right.

W I L L I A M R. R I C H A R D, J R.,
called as a witness herein, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MS. STEIN:

Q What is your name, please?

A William R. Richard, Jr.

Q Your business address?

A 800 North Lindbergh Boulevard, St. Louis.

Q Your home address?

A 729 Delchester Lane, Kirkwood, Missouri.

Q Did you review any documents before you came to this deposition?

A Yes.

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Q Did you discuss this deposition with any attorney?

A Yes, with Jim.

Q Could you give me your educational background, please?

A A graduate of Amherst College.

Q In what year?

A The Class of '43, but I got out in '42.

Q Could you explain that?

A Yes. The War was on and they had an accelerated program so we went continually. We did not have any vacations or summer school as part of it so we got out in December of '42.

I have a Master's in Science from the University of Michigan. And I have a Ph.D.

Q Excuse me for one second.

Could you tell me what your undergraduate degree was in, please?

A Chemistry; major, Chemistry.

Q You have a Master's Degree?

A Master's Degree in Chemistry from the University of Michigan and a Ph.D. in Chemistry from the University of Michigan.

Q In what year did you receive your Master's

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Degree, please?

A '47.

Q What year did you receive your Ph.D.?

A I got out in '50 and it was granted in the next semester, '51.

Q What did you do between December of 1942 and whenever it was that you commenced your studies for your Master's in Chemistry, and could you tell me when it was that you commenced your studies for your Master's in Chemistry?

A I worked for Monsanto Chemical Company at that time.

Q When did you begin your studies for your Master's in Chemistry at the University of Michigan?

A In the summer of '46.

Q Do you remember the month?

A Whenever the summer session started, June or July.

Q What was your job at Monsanto between December of '42 and the summer of '46?

A I was a research chemist for Monsanto. I was a research director for Schwinnigen Resins Corporation.

Q Is the Schwinnigen Resins Corporation related

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by corporate structure to the Monsanto Company?

A It is now. Before it was a 50/50 owned.

Q 50 percent of the stock was held by Monsanto?

A I don't think there was any issued stock, but I do not know that. It was a 50 percent owned by Monsanto and 50 percent owned by Schwinnigen Power Company in Canada.

Q You began in Monsanto in the end of 1942?

A That's right, maybe the first part of '43, January.

Q How long did you work there before you went to Schwinnigen Resins?

A Roughly a year and a half, two years.

Q Then you worked at Schwinnigen Resins Corporation until you went to the University of Michigan?

A I worked there roughly a year and came back to Monsanto.

Q Do you remember when it was that you returned to Monsanto from Schwinnigen Resins Corporation?

A Not exactly, no.

Q Did you work at Monsanto until you started your studies for the Master of Chemistry at the University of Michigan in the summer of 1946?

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A That's right.

Q Could you describe your duties as a research chemist at Monsanto from the time that you graduated from college until you went to Schwinnigen Resins Corporation?

A I worked in the Safety Glass Group on polyvinyl butyral doing first analytical work on polyvinyl butyral resins.

Q In what division was the Safety Glass Group?

A It was the Plastics Division and still is.

Q What were the products that were manufactured in the Safety Glass Group used for? What kinds of products were they and what were their uses?

A Safety glass interlayer in automobiles and to some extent, bulletproof vests and things like this. These were some of the War uses.

They were used in thermoset version, was used to waterproof Quartermaster Corps articles like raincoats, things like that.

Q When you went to Schwinnigen Resins, what kind of work were you doing there?

A I was doing process work at Schwinnigen. Schwinnigen Resins made resin and I was working on a process that heats, particularly the heat stability

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of the resin.

Q What products were these, was there more than one kind of resin that they were making?

A Yes, you make polyvinyl acetate first and polyvinyl alcohol and butyral and various versions of it, minor versions of it.

Q What products were these resins used in?

A I said they were used in safety glass.

Q These are the same products as those that Monsanto made?

A They make. Schwinnigen made resin, polymer. Monsanto took that resin and made it into plastic. They added plasticizers and stabilizers and extruded it into sheet form or compounded it into thermoset products which then went to rubber companies which was then calendered on the cloth for rainproofing, waterproofing cloth.

Q What were the plasticizers that Monsanto used when fashioning these products?

A Depends.

Q Safety glass.

(Mr. Shapiro entered the deposition room.)

BY THE WITNESS:

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A The principal one would be dibutyl sebacate.

Q Did they have a trade name?

A Not to my knowledge.

Q What is the chemical composition of that substance? What are the components?

A Butyl alcohol and sebacic acid.

Q What is that?

A Sebacic acid is a dicarboxylic acid and butynol is a four-membered aliphatic alcohol and it is stearified. Monsanto did not make that product. We bought it.

Q From whom did you buy it?

A One of the suppliers of commercial solvent. I don't know about anybody else.

Q You said you did analytical work when you were working at Monsanto before you went to Schwinnigen Resins.

A Right.

Q Could you describe what your functions were?

A I was working on a Master's, or as I said, analysis on butyral resins.

Q Is this for detection of some kind, what do you mean by analysis?

A Analyze the determining part of the composition

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of resin. That was after the acetal content analysis.

Q After you worked at Schwinnigen Resins and you went back to Monsanto before going on to get your Master's Degree, what were the functions that you performed at Monsanto?

A I was a research chemist, again worked on polyvinyl chloride.

Q Was it analytical work again?

A No.

Q What kind of work were you doing?

A Suspension polymerization.

Q Could you describe what suspension polymerization is?

A You take vinyl chloride, copolymers, suspend in water, polymerize it into solubility.

Q Was this aimed at a particular product?

A Yes, polyvinyl chloride resin.

Q For what would Monsanto use the polyvinyl chloride resin?

A It is pretty common, insulation and calendered goods.

Q Calendered goods?

A Yes.

Q What is that?

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A A calender is a machine that rolls plastic resin and plasticizers are added to the thin sheet.

Q This is a process for making plastic materials different from, say, extrusion?

A Yes.

Q When you were studying for your Master's at the University of Michigan, what did you write your thesis on?

A I didn't write a thesis for a Master's Degree.

Q Did you specialize in any way?

A I took a Master's in Chemistry, which had a proscribed number of courses, according to the Chemistry Department.

Q Did you specialize in organic chemistry as opposed to inorganic chemistry?

A The Master's Degree to fulfill the requirements at the University of Michigan, I had to take courses in organic, inorganic, some physics courses, some physical chemistry, so I did not specialize in any one area.

Q Did you write any papers during the time that you were studying for your Master's at the University of Michigan?

A No, I didn't need a thesis, didn't write a paper.

Q In other words, at Michigan in order to fulfill the requirements for a Master's, you were required to complete so many course hours and that was the extent of it?

A Yes.

Q How many courses were required for a Master's in Chemistry?

A I don't remember.

Q Did you begin your studies for a Ph.D. in Chemistry immediately after completing your Master's in Chemistry?

A Yes, it was continuous.

Q That would have been in 1947?

A Yes.

Q It took you approximately three years to get your Ph.D.?

A Yes.

Q Did you write a dissertation?

A For a Ph.D.?

Q For your Ph.D.

A Yes.

Q What was your subject?

A Polymer Plasticizer Gels, or maybe the Structure of.

Q Or maybe the Structure of Polymer Plasticizer Gels?

A Yes.

Q What are polymer plasticizer gels?

A A typical illustration would be plasticized polyvinyl chloride, polyethylene or polyvinyl butyral, a combination of polymer and plasticizers.

Q What are their uses?

A We have described some uses already.

Q Were there other uses?

A Yes, multitudes of combinations in thermoplastic resins and plasticizers.

Q Did Monsanto pay for you to get a Ph.D.?

A No.

Q Did they pay for you to get a Master's?

A No.

Q Did you go back to work at Monsanto after you got your Ph.D.?

A Yes.

Q In which division did you work at Monsanto after you got your Ph.D.?

A I think the name of it was Central Research

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Department at that time.

Q Central Research Department?

A Yes.

Q What did you do there?

A I was a research chemist.

Q Were you assigned to any particular group or division within Monsanto that you worked particularly closely with?

A I worked in the Physical Chemistry Group.

Q What were the responsibilities of the Physical Chemistry Group?

A Well, I worked on heat stability of polyvinyl chloride.

Q This was a continuation of the work you did before you got your Master's?

A A slight continuation.

Q Was this analytical work?

A In part.

Q What was the other part of it?

A The mechanism and trying to dope out why the resin degraded under heat.

Q Did you find answers as to why it degraded under heat?

A Partial answers.

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Q What were the answers that you found?

A Some impurities such as small traces of ketones, small amounts of unsaturation left in the resin.

Q What use was made of the results of your studies?

A Well, polyvinyl chloride, one of the drawbacks to it has been heat and light stability of it. I think the way around it turned out to be you add certain stabilizers.

Q What were some of the stabilizers that were added?

A I don't think -- they are usually tin compounds and lead compounds.

Q Metallic substances, usually?

A Usually; not always.

Q If a metallic compound were not used, what would another stabilizer be?

A I think you would have to go to some proprietary compositions. Symogi has some and there are other companies. I can't name them right now that would have stabilizers.

Q Does Monsanto produce any stabilizers?

A I think Monsanto did not produce any

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stabilizers.

I correct myself. They might have produced some phosphate esters which were used in part.

Q How long did you work in the Physical Chemistry Group in the Central Research Department at Monsanto after you began there in 1951?

A Approximately a year.

Q To whom did you report, what was the title of the person to whom you were reporting?

A I reported to my group leader.

Q Was that the group leader's responsibility or was it to verify the accuracy of your studies? Was it to pass the information on to Marketing, what were the functions of the group leader?

A To help organize and direct the work that was being done in his department, his group.

Q Was it the group leader who determined the priorities of the work?

A In part.

Q Who else was responsible for determining the priorities of the work in that group?

A Director of Research.

Q Do you remember the name of the person who was the Director of Research in 1951?

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A Samaris, S-a-m-a-r-i-s.

Q What were the other groups in the Central Research Department other than Physical Chemistry Group?

A I can't name them all; a number.

Q Do you remember the names of any of them?

A Analytical Group. There were various organic groups under various group leader names. I don't think they had any special given names.

There was a detergent analysis or evaluation would be a better term. There was a pilot plant group.

Q What were the functions of the Analytical Group?

A To analyze chemicals.

Q All chemicals, Monsanto chemicals?

A This was not a production facility. It was to help the research that was going on at that particular lab.

Q Did they work with the marketing groups at all or did they develop the ideas?

A There was a central research and normally at that time, not directly tied to a marketing section.

Q This would be true for all the groups in the Central Research Section in that they were not specifically tied to any marketing group, is that correct?

A For most groups, that was true.

Q For which groups was it not true?

A Surface Coatings.

Q To whom were they related?

A To the Sales Group.

Q Do you remember the names of any of the organic group in the Central Research Department or the particular products on which they worked or the chemicals, rather than brand names?

A Yes. There was Emerson's group. It usually went by the group leader; Cosmon's group, J. Harris' group.

Q Any others?

A Paul Marling's group.

Q Any others that you remember?

A There were others, but I don't remember.

Q What did Emerson's group work on?

A Oxidation, aromatics.

Q Pardon?

A Things like benzoic acid.

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Q Any others?

A Cosmon's group worked on detergents. J.

Harris worked on detergent evaluation.

Q And Mr. Marling's work?

A They worked on surface coatings.

Q What were some of the substances that were used to do surface coatings?

A Phthalic acid, maleic anhydride and glycol.

Q Were there any chlorinated hydrocarbons used as surface coatings?

A I'm not sure of that answer.

Q The phosphate esters that were used as stabilizers, what were they used as stabilizers for?

A Coatings in polyvinyl chloride compositions.

Q Any other chemicals they were used as stabilizers for?

A I'm not familiar of all the market uses for phosphate esters.

Q Could you tell me those market uses with which you are familiar with phosphate esters as stabilizers?

A Stabilizers as polyvinyl chloride compositions.

Q Any others?

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A I repeat. I am not familiar with all the market uses for phosphate esters.

Q I understand that, but are there any other uses with which you are familiar other than poly-vinyl chloride?

A No.

Q After you worked for a year in the Central Research Department in the Physical Chemistry Group, what did you do at Monsanto?

A I worked in the High Pressure Laboratory.

Q High Pressure Lab?

A Yes.

Q What is the High Pressure Lab?

A It is a building to do high pressure reactions.

Q Could you describe what you mean by high pressure reaction?

A Normally anything that is not safe in the laboratory, this might be a thousand pound or more, or something that might explode or be dangerous, build up pressure.

Q Could you give me an example of one of the experiments that you ran?

A Polymerization of ethylene into polyglycol.

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Q Do you remember any others?

A That was the principal reaction I worked on.

Q How long did you work in the High Pressure Lab?

A About five years.

Q To whom did you report when you worked in the High Pressure Lab?

A Dr. Calfee.

Q What was his title?

A Group Leader.

Q To whom did Dr. Calfee report?

A Earl Gleesenkamp.

Q What was Mr. Gleesenkamp's title?

A - He was a Director of the Central Research Department Lab at the time.

Q For the exact five years?

A I cannot name the time interval when he was named.

Q Did you have any people working for you or reporting to you while you were in the High Pressure Lab?

A Indirectly I had some technicians working for me.

Q What do you mean by indirectly?

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A They didn't report to me administratively. They reported to me in the technical sense.

Q To whom did they report administratively?

A Calvin, the group leader.

Q Could you describe what the functions were of these technicians, the kinds of work they were performing?

A To build equipment, put it together, run experiments.

Q Did you actually run any experiments yourself?

A Yes.

Q What were the experiments that you ran?

A To polymer ethylene and polyglocol.

Q At the time that you were working in the High Pressure Lab on this polymerization project, was this towards a goal of developing a specific product?

A Yes, develop a process for polyethylene.

Q Were your efforts successful?

A Yes.

Q Did Monsanto possess a patent in that process?

A Monsanto patented part of the process.

Q Do you remember the year in which the patent was granted?

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A No.

Q Was it before 1956?

A I don't know.

Q Would it have been before 1960?

A Possibly.

Q Do you remember when you left the work in the High Pressure Lab, what year that was?

A I never really left. I stayed in the same group but I worked on low pressure polyethylene for a period. The exact dates, I don't have.

Q Can you give me an approximate date, years if you cannot remember months?

A I would say in the years following '55, '56, '57, along in there; '58.

Q You worked on low pressure polyethylene?

A I was in the same group.

Q In the same group?

A Yes.

Q This was all until about 1958?

A Yes. Well, no. I went to St. Louis in 1961.

Q Where was the High Pressure Lab located?

A In Dayton, Ohio, this particular one.

Q If there were others, do you know where they

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were located?

A This was Monsanto's main High Pressure Lab at that time. There may have been others.

Q And the low pressure polyethylene work was carried out in Dayton?

A That's where I did my work.

Q And this would have been before 1961?

A Correct.

Q I am a little confused on the chronology. You went to St. Louis in 1951?

A No, '61.

Q After you got your Ph.D., you went back to work at Monsanto, is that correct?

A That's correct.

Q Where were you working?

A In Dayton, Ohio.

Q You went right to the High Pressure Lab?

A No.

Q You went to the Research Department at that time which was located in Dayton?

A The Central Research Department.

Q For Monsanto?

A For Monsanto.

Q For all the Monsanto --

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A Yes.

Q That was in Dayton and you stayed in Dayton until 1961?

A Yes.

Q Could you tell me what the difference was in your experiments on high pressure polymerization with polyethylene and low pressure?

A The difference in pressure.

Q What does that mean, what is the significance of that?

A Low pressure meant that it was under 100 pounds. High pressure was normally 22,000 pounds and upward.

Q What about the difference between 100 pounds and 22,000 pounds?

A What about the difference?

Q Was there a difference, was that called medium pressure or what was that called?

A Well, it wasn't. People didn't operate in the medium. We didn't, anyway.

Q What was the process under the low pressure conditions for creating the polyethylene?

A It was based on Ziegler calculus chemistry.

Q Could you describe that, please?

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A A man named Ziegler found a catalyst which was composed of transition metal alkyl and triethyl-aluminum and the combination, this combination made an active ethylene polymerization.

Q Was there a difference in cost between the low pressure process and the high pressure process? Was there a difference in the kind of equipment used?

A Both processes had been used commercially.

Q Is one more efficient than the other?

A Both are commercially viable processes.

Q In 1961 when you went to St. Louis, you continued working for Monsanto?

A Yes.

Q In which department did you work?

A I worked in the Central Research Department, or I guess at this time it was renamed Research and Engineering Division.

Q Do you remember when this renaming took place?

A No.

Q Who was the head of the Research and Engineering Division?

A A man named Symogi.

Q Could you spell that?

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A I'm not sure. S-y-m-o-g-i, or something like that.

Q Did you report to Mr. Symogi?

A No. I reported to Mr. Gleesenkamp.

Q Mr. Gleesenkamp who had been Director of Central Research Department in Dayton was now in St. Louis and he was your immediate supervisor and Mr. Symogi was above him?

A That's right. I worked for Calfee for some time and then reported to Gleesenkamp a while later. Symogi was Gleesenkamp's boss.

Q What were the duties that you performed, starting in 1961 at the Research and Engineering Division?

A I started a project which we called heavy duty plastics.

Q Could you tell me what that was, please?

A It was a soul-searching project aimed at new compositions of matter which would go into building product.

Q Did you develop any such products?

A Yes.

Q What were the names of them?

A The work eventually led to a series of

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inorganic accommodations with nylon and marketed under the trade name Vydyne, I think is the spelling.

Q How long did you work on this heavy duty plastics project?

A Approximately from '61 to part of '63.

Q Through --

A Part of '63. I don't remember the exact date.

Q How many people were working on this project with you?

A Roughly eight to ten.

Q Were there any other products than Vydyne that came out of this project?

A None that have been commercialized.

Q After this heavy duty plastics project, what did you do next? You stayed at Monsanto, did you not?

A Yes.

Q Where did you next work, what was the name of the division?

A The Organic Division.

Q You went to the Organic Division in 1963?

A 1963 or thereabouts.

Q Is the Organic Division a manufacturing

division?

A It was a manufacturing division.

Q What did it manufacture, what products were manufactured?

A Organic chemicals.

Q What was the title of the position you held in the Organic Division?

A I was Manager of Research.

Q How long did you hold that job?

A In the Organic Division, there are problems here because I cannot remember when Organic Division, some of the titles, the different titles changed. But I was in the Functional Fluids area, roughly ten years.

Q That would be from 1963 to 1973, approximately?

A Well, or '74. It was '63 or '4 to roughly 1974.

Q After 1974 where did you go?

A I went to Process Chemicals which it was then in the Monsanto Industrial Company.

The Organic Division had been merged with the Inorganic Division to form the Monsanto Industrial Company.

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Q When was that?

A I would guess sometime in the early '70s.

MS. JACOBS: Is that Monsanto Industrial Chemicals Company or just --

THE WITNESS: I think they called it MICC and it has been shortened to MIC, so I think it was probably Monsanto Industrial Chemical Company to start with and maybe they dropped the Chemical.

BY MS. STEIN:

Q How long did you work in the Process Chemicals Division or was it Group?

A I don't know what they called it, whether it was, I guess it was called a division.

Q Beginning in about 1974?

A 1974, late '74.

Q How long were you in that position?

A I am still in it now. It was shifted to the Monsanto Intermediates Company.

Q What is your title?

A I am Director of Technology.

Q Could you describe the duties of the Director of Technology in the Process Chemicals Division?

A It is to organize the research and technical

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effort that is devoted to a series of products, roughly 20 products.

Q Are these products which have not yet come onto the market?

A No, these are products that are being produced now.

Q Could you give me the names of those products, please?

A Maleic anhydride.

Q Does that have a trade name?

A No.

Q What are the uses of maleic anhydride?

A It is used in alkyl coating resins, in surface coatings.

Q Anything else?

A It is used in oil additives. It is used in insecticides. It is used in polyester resins.

Q Is it used as a stabilizer, what is its function?

A Normally not.

Q What is it used for?

A It is used as a building block.

Q What is another product?

A Sulfuric acid.

Q Do you market that under any kind of trade name?

A No.

Q What is another product of the Process Chemicals Division?

A Sodium hydroxide and potassium hydroxide and chlorine.

Q Any other products?

A We make chlorobenzene, nitrochlorobenzene.

Q What are those products used for?

A Intermediates.

Q In what?

A Rubber chemicals.

Q Are there any other uses for chlorobenzenes or nitrochlorobenzenes?

A Chlorobenzene is sometimes used as a solvent.

Q In industrial uses?

A In agricultural use.

Q Could you give me a specific example?

A It is used in L-A-S-S-O.

Q What is LASSO?

A Agricultural chemical.

Q Is it a pesticide of some sort?

A It is a herbicide.

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Q What crops is it used on?

A I can't really tell you, but I think corn. Other uses, I am not familiar with details of agricultural products.

Q Are there any other for chlorobenzene that you know of?

A It has been reported to be used as a whole host of solvents, but we don't have anything really to do with that part of it. Monsanto doesn't make those type of products.

Q Do you market it under a trade name of some kind?

A I think we sell none outside.

Q Is it used?

A Used internally as an intermediate and a solvent.

Q What about hydrochlorobenzene. Didn't you say chlorobenzene as well as hydrochlorobenzene was used?

A I don't think there is any such.

Q What other products are from the Process Chemicals Division? You have listed maleic anhydride, sulfuric acid.

A We make ortho-nitroaniline.

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Q What is that used for?

A As an intermediate.

Q In what?

A Principally rubber chemicals.

Q Is it used as a solvent?

A No.

Q What is its chemical composition?

A The name describes the chemical composition.

Q I would appreciate it if you would tell me the specific chemical components that are present in it.

A Ortho-nitroaniline contains nitrogen, carbon and hydrogen.

Q What is the configuration?

If you would like a piece of paper to draw it --

A I can describe it. You draw a benzene ring, take off two hydrogens, put a nitro group in one position and put an amino group in another next to it, adjacent to the position.

Q What is a nitrogen group?

A NO_2 .

Q What other products do you have in the Process Chemicals Division?

A They have elemental phosphorus.

Q What is that used for?

A It is used as an intermediate to make phosphoric acid.

Q Does Monsanto market the elemental phosphorus?

A In small quantities.

Q Do you market phosphoric acid?

A Yes, but Process Chemicals does not.

Q Pardon?

A Process Chemicals does not. Monsanto does.

Q What is phosphoric acid used for?

A An acidulating agent in foods.

Q What is an acidulating agent?

A - Something to make something acid.

Q As opposed to base?

A Yes.

Q What other products are coming out of your division?

A We make P_2S_5 , phosphorus pentasulfide.

Q What is that used for?

A It is used as an intermediate in oil additives, also used as an intermediate to make insecticides.

Q Is that marketed by Monsanto?

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A Yes.

Q Is there a trade name for it?

A No.

Q Do you know what insecticides it is used with?

A Parathion.

Q Any others?

A That's it.

Q Do you know what uses are made of Parathion, what particular crops it is used on?

A Usually cotton. Again, I am not an expert in insecticides. We don't make that part of it.

Q What other products does your division produce?

A We make phosphorus trichloride.

Q What is that used for?

A As an intermediate.

Q In what?

A It is an intermediate in making phosphorus oxychloride.

Q What is phosphorus oxychloride used for?

A An intermediate in making phosphate esters. It can also be used to make other intermediates such as acid chlorides.

Q What are acid chlorides used for?

A They are used in places where we want to
stearify and you have a difficult esterification.

Q Esterification?

A Yes.

Q What is that, please?

A A reaction, normally of an alcohol or amine
with an acid.

Q Amine with an acid?

A In the case of esterification, it is alcohol.
In the case of amine, it would form an amine acid
chloride, formed either way.

Q Is this an intermediate in building another
compound?

A Yes.

Q What are some of those other compounds
that are produced?

A We don't produce any acid chlorides.

Q Could you tell me what the name of one is?

A Terephthaloyl chloride. That is used by
DuPont Division.

Q Is there a trade name?

A I believe Kevlar.

Q Do you know what that product is used for?

A It is an aromatic high temperature fiber.

Q Can you tell me what a phosphate ester is, please?

A It is a combination of a PO group and normally 3OR or O aromatic groups attached to the phosphorus.

Q Do you market any phosphate esters?

A Monsanto does. Process Chemicals does not.

Q You have drawn the distinction on a couple of occasions between Process Chemicals marketing something and Monsanto marketing of something.

Are there substances which Process Chemicals does in fact market but Monsanto doesn't?

By drawing the distinction you invited me to ask the question.

A You are very sharp.

It depends on whether another company in Monsanto markets it or whether Process Chemicals markets it directly ourselves. We are in the intermediates. We may supply another company in Monsanto, the intermediate, and they would market the product.

Q So you would market, say, the elemental phosphorus?

A I said in small quantities.

Q Directly to the outside?

A Yes, sometimes.

We also supply it internally to Monsanto.

Q The phosphate esters you supply to another portion of Monsanto?

A No.

Q You market those?

A We supply phosphorus oxychloride. Another company makes the ester and markets the ester.

Q Which company do you supply the phosphorus oxychloride to?

A The Industrial Company, Monsanto Industrial Company.

Q They process, manufacture the phosphate esters?

A Yes.

Q It is Monsanto Industrial Company that markets the phosphate esters?

A Right.

Q What products are made up or contain the phosphate esters?

A Normally functional fluids, sometimes plasticizers.

Q Could you describe what you mean by a

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functional fluid?

A A fluid that is used to perform a function such as mechanical function, electrical function, heat transfer function.

Q Do you know the trade names of some of the fluids that are sold that contain phosphate esters?

A Skydrol.

Q How do you spell that?

A S-k-y-d-r-o-l.

Q What is that used for?

A Aviation hydraulic fluid.

Q Any others?

A Pydraul.

Q What is Pydraul used for?

A It is used in industrial hydraulic fluids.

Q Are there different formations of Skydrol?

A There have been variations, yes.

Q What were some of those variations? Was there a different chemical makeup, different viscosity?

A I am not at liberty to describe all the different ones. It may be I don't know them all.

Q Do they have different identifying marks or numbers or letters?

A Yes.

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Q Could you tell me please, what those are or were?

A Skydrol 500A -- I can tell you some of the early ones; Skydrol 500B, Skydrol 500C.

Q What is the current one?

A I am not familiar with what the current one is.

Q Do you know whether Skydrol 500A or 500B or 500C is still marketed at all?

A None of those are marketed now.

Q Do you know why?

A They have a better formulation.

Q Did the previous Skydrol contain chlorinated hydrocarbons?

A No.

Q Have they always been phosphate ester-base?

A Right.

Q Could you give me some of the different identifying numbers for the various Pydrauls that are currently marketed?

A I don't know the current product line, Pydraul.

Q Do you know who has responsibility for marketing the current Pydraul line?

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A Industrial Company, but I don't know.

Q Is there a title of somebody there or a name?

A Malacha is the marketing man, but I don't know. I would suspect that Lee Miller is the Managing Director.

Q Pardon me?

A Lee Miller is the General Manager, I believe. I think that is wrong. I think it has been changed recently.

I don't know who the General Manager of that division is. English, I guess English is probably the correct name.

Q What are the other products that are used? We have maleic anhydride, sulfuric acid, sodium hydroxide, potassium hydroxide, chlorobenzene, ortho-nitroaniline, phosphorus.

A I said we had nitrochlorobenzenes.

Q What are those used for?

A Intermediates.

Q In what?

A Rubber chemicals and also used in drugs such as Tylenol.

Q Do you market that or does the Monsanto

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Industrial Company market that?

A Neither one.

Q What do you do with it?

A I think that is McNeil Laboratories.

Q The nitrochlorobenzene?

A No, the Tylenol it is made into is McNeil's product.

Q Yes, but you produce the nitrochlorobenzene?

A We produce, process, yes, produce the nitrochlorobenzene.

Q Where does that go, Monsanto Chemical?

A For further processing.

Q Other than for use in rubber chemicals or Tylenol, what else is it used for, do you know?

A Some of those compounds are used as dye intermediates. I am not familiar.

Q D-i-e?

A D-y-e.

Q What other products does Process Chemicals Division produce?

A Produce ortho-nitrophenol.

Q Phenyl?

A Ortho-nitrophenol, p-h-e-n-o-l.

Q What is that used for?

A An intermediate, furandione.

Q What is furandione?

A It is not our product. I don't know the exact formula for it. It is a FMC product.

Q Do you know what use it is marketed for?

A Yes.

Q What use?

A Corn root worm protection.

Q What else do you produce?

A I think that's about it. How many have I got?

Q I think nine. You said there were about 20.

A There are.

We produce sulfosalicylic acid.

Q What is that?

A That is used in anodizing aluminum.

Q Do you market that directly to the outside?

A No. We sell it to outfits like Kaiser, aluminum producers.

Q We are up to about 10. What others are there that you produce?

A Tetrachloric anhydride.

Q What is that used for?

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A That is used as a fire retardant in polyester resins, built-in.

It is also used as a stabilizer.

Q Do you market that or does Monsanto Chemical market that?

A We market it.

Q Are there any other products?

A I think you got most of them.

Q So even though --

A I would have to look the list over.

Q Originally you said you thought there were about 20 products.

You organize the research and technical effort for about 20 products and then you named or we have discussed maleic anhydride, sulfuric acid, sodium hydroxide, potassium hydroxide, chlorobenzene, nitrochlorobenzene.

A There are two: nitro and para.

Q What are the differences?

A In the division of two isomers.

Q Are there any functional differences that result?

A Some downstream derivatives are different.

Q Then another product would be ortho-nitroaniline,

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phosphorus P_2S_5 , phosphorus trichloride, is that correct?

A Right.

Q All those phosphoruses are different?

A Phosphorus oxychloride. Do you have that?

Q Yes.

A Ortho-nitrophenol and the sulfa, sulfo-salicylic acid.

Q And tetrachloric anhydride, is that correct?

A Yes.

We also make cyclohexanol.

Q What is that used for?

A Cyclohexanol, presently to make cyclohexene.

Q What is that?

A It is the main derivative of cyclohexanol and it is used as eventually in a rubber chemical.

Q Are there any other uses for it?

A There may be. I am not sure here, but my best guess is there would be some phthlate or esters made from cyclohexanol.

Q What kind of esters would you make? Would it be phosphate esters?

A Probably phthlate esters.

Q The cyclohexanol that you produce, where

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does it go? Do you sell it?

A We sell it to the outside but it also is in use as an intermediate in making adiptic acid.

Q Adiptic?

A Yes.

Q What is adiptic?

A D₆, dibasic acid.

Q What is that used for?

A Nylon, principally.

Q How many people work under you directly in your capacity as the Director?

A Approximately 60.

Q 60?

A Yes.

Q What are their functions and job descriptions? Are there chemists, administrative people, could you give me a breakdown of the organizational structure of the department that you head?

A I have three Managers of Research and one Group Leader that report to me.

Q Are they broken down by substance, by chemical?

A Yes.

Q Could you please describe each of them, what

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the title of each of them is and the particular substances for which he or she is responsible?

A One manager is responsible for maleic anhydride. One manager is responsible for aromatics and base chemicals.

Q Which substances are covered there?

A It is easier to keep going.

Q All right.

A One group leader is responsible for phosphorus. One manager is responsible for new growth.

Q New growth?

A New growth, new projects, new products and some administrative work.

Q The one manager in research is responsible only for maleic anhydride?

A That is correct.

Q And the one group leader is responsible only for phosphorus?

A Yes.

Q Then all of the other chemicals that you have discussed are under the responsibility of another manager?

A Yes.

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Q And then you have a third manager responsible for new growth, new projects and some administrative?

A Yes.

Q What is the difference between a group leader and a manager?

A Group leader is the primary supervisor over research chemists and research engineers.

Normally a manager would have either group leaders or sometimes senior scientists reporting to him.

Q Are there group leaders that report to these three managers?

A Yes.

Q How many group leaders report to the manager responsible for maleic anhydride?

A Three.

Q Does each of these group leaders have a different function?

A Yes.

Q Could you describe what those different functions are?

A One is in charge of reactors and reaction. Another is in charge of catalysts, catalyst preparation.

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Another is in charge of collection and refining.

Q Of the maleic anhydride?

A Yes.

Q Is that sort of a quality control job, this third one?

A No.

Q Could you describe what it is?

A Maleic anhydride is made by dilution of air and oxidation so the product has to be collected, separated from the air and it has to be refined. Normally that is by distillation.

Q Who performs these various functions under the group leader? Are there chemists?

A There are chemists and chem. engineers.

Q The manager who is responsible for new growth, does that person have group leaders reporting, too?

A No.

Q Does that person in addition report directly to you of communication with other portions of Monsanto and with the outside?

A Yes.

Q Could you describe more fully what that

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WATER_PCB-SD0000022138

manager's functions are?

A The manager for new growth, new projects?

Q Yes.

A It is to see what products we could recover from our byproducts; buy products in teams, what division, what teams, intermediates would be related to our product line that we might make in the future. He is responsible for interviewing, setting up interviews for hiring and new chemists and new engineers.

Q Does that manager have any marketing responsibilities?

A No direct marketing responsibility, none.

Q In the Process Chemicals Division who has marketing responsibilities? What is the name of that person?

A The Marketing Director. Well, it is really a marketing and planning function.

Q Who is that person?

A Don Olson is the Director, but I am trying to think, Bob -- I will think of it in a minute.

Q What is your relation with the Marketing and Planning Director?

A I have no direct relationship.

Q Do you have any informal contacts with him?

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A I have contacts with a man that reports to him. That man is Bill Hicks, William Hicks.

Q What is his title?

A He is probably Director of Planning and Marketing or Planning and Control for Process Chemicals.

Q Do you know what Don Olson's title would be then?

A Something like Director of Marketing.

Q Mr. Hicks and Mr. Olson have similar duties but you report to Mr. Hicks, but not Mr. Olson?

A I report indirectly to Hicks. I report to a General Manager, Dmythyszin.

Q Is he the General Manager of Process Chemicals?

A He is the General Manager of Technology for the Intermediates Company.

The name is Bob Potter.

Q Bob Potter?

A The General Manager of Planning and Control. He is over Olson.

Q Let us go back to your educational background and training.

Have you had any supplemental courses of any kind relating to chemistry since you got your

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Ph.D.?

A Relating to chemistry, the answer is no.

Q Have you had any other training courses?

A Yes.

Q What are they related to?

A Management.

Q Were they at Monsanto?

A Sometimes.

Q Do you remember the titles of any of them
and the dates you took them?

Let us start with the ones at Monsanto.

A I remember some of the titles. I can't
remember some of the dates.

Q Why don't we start with the titles and the
dates that you do remember.

Let us start with the ones at Monsanto.

A Well, Kepner-Trego.

Q What is that?

A That is the name of the two men that made
up this course.

Q What was the substance of the course?

A Language analysis and problems.

Q Do you remember when you took them?

A Analysis of products.

Early '64, I'd say '64.

Q What other courses do you remember taking?

A Interviewing techniques.

Q Was that sponsored by Monsanto or given at
Monsanto?

A Given at Monsanto.

Q Do you remember when that was?

A Same time frame.

Q Any other courses at Monsanto?

A Management of motivation.

Q Management of motivation?

A Yes.

Q Do you remember when you took that?

A Roughly '75.

Q Any others?

A Conference leadership.

Q Do you remember when you took that?

A Don't pin me down exactly, '76 somewhere.

Q Any others?

A Probably. I don't remember them all.

Q Could you describe the course on management
of motivation?

MR. SCHINK: Just a minute.

Ms. Stein, we have been going for an

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hour and a half and we haven't even touched on the subject matter of this lawsuit. Do you really think this is relevant, Ms. Stein, to the issues that the Government is seeking to litigate here?

We have Dr. Richard. He is a very busy man, has come here to Chicago for the Government's convenience.

I have been sitting by while you have gone over all of these chemicals that have been produced by the division that has nothing to do with the issues in the lawsuit. Don't you think we are getting far afield?

MS. STEIN: I don't. If I did, I wouldn't continue.

BY MS. STEIN:

Q If you can, please describe the management of motivation courses that took place?

A It is a week-long course. I don't think I can describe it for you.

Q It is a management philosophy of some sort?

A Yes.

Q Do you have any recollection of what was taught during that course?

A Yes.

Q Could you describe what you remember?

A Do you think this is relevant?

Q The witness is not to ask the questions.

I think management philosophy is relevant to this lawsuit and you have been describing your functions as a manager. I would like to find out more about that.

A I think the aim of the course is to teach cooperation.

Q Within the company?

A Yes, within the company, within the management framework.

Q Did you take any other management courses from those you have described?

A On the outside, yes.

Q Would you tell me what those courses were and what they were about?

A I think the principal course I took was the Industrial Institute sponsored a course at Harvard Business School.

Q How long did that course last?

A Just two weeks.

Q What was the title of the course?

A I don't remember the specific title, but

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whatever the IRI gives, a summer course.

Q Do you remember when you took that?

A I'd say about '67.

Q Do you remember anything at all about that course?

A Yes.

Q Could you describe briefly for me what you do remember about that course?

A I think the principal thing is how the course was taught. It was by case history, by indirect questions.

Q Did it discuss management philosophy at all?

A It discussed leadership styles.

Q Have you ever taken any courses on marketing?

A None.

Q Have you ever published any articles in any publications?

A A few.

Q What were the titles of those publications?

A I published a note on my thesis in the Journal of Chemical Physics.

Q Do you remember when that was?

A Roughly '49 or '50.

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Q Do you have any other publications?

A Yes. I did an article on stabilizers in Petroleum Refiner, roughly '50, '51, '51 probably, somewhere in there.

And the other publications have to do with patents.

Q Could you be a little more specific by having to do with patents?

A Our patents, they are patents.

Q These are materials --

A These are patents that were granted to Monsanto and with my name on them.

Q These were patents that were granted as a result of research that you had done and this was material that was done in connection with your research and then submitted in conjunction with the patent application?

A Patent application, Patent Office.

(Ms. Kaye Jacobs left the deposition room.)

BY MS. STEIN:

Q What are those products?

A I don't think I can name them, but there are roughly 30 or so patents.

Q Do you remember when any of these patent applications were submitted?

A I would have to -- you know, if you want the exact dates and so forth, you would have to get a list of the patents.

Q Yes, I would like that, okay?

MR. SCHINK: We will consider whether it is relevant or not to the documents that are called for by discovery. If it exists, if we have it available, but we will see if it is relevant.

BY MS. STEIN:

Q Were these patents on materials that were stabilizers?

A I think I maybe have one or two on stabilizers; probably one.

Q What were the others?

A Well, there was some on polyvinyl butyral process.

MR. SCHINK: Do any of them relate to the polychlorinated biphenyls, Dr. Richard?

THE WITNESS: None.

MR. SCHINK: I think we will decline to produce those.

BY MS. STEIN:

Q Do any of them relate to hydrocarbons?

A None.

Q Have you ever given any speeches in front of trade associations of any sort?

A Trade associations?

Q Professional societies?

A Trade associations, the answer is zero, none. Professional societies, I have been Program Chairman and things like this in the Society of Research Administrators.

Q Are you a member of that Society now?

A Yes.

Q What is the Society of Research Administrators?

A It is made up of roughly 700 or so people who are research administrators and they come from universities, come from government labs and come in part from industry, possibly hospitals and medical.

Q Are you a member of any professional society?

A I am a member of American Chemical Society.

Q Do you hold any office, are you an officer?

A No, I am not an officer.

Q Have you ever been an officer in that Society?

A No.

Q Are you a member of any other professional societies?

A I am a member of the American Association for the Advancement of Chemists -- excuse me, of Scientists, AAAS, Scientists.

Q Are you a member of any of the sections?

A No, I am not.

Q Are you a member of any other societies?

A I guess I am still a member of the Association of Lubrication Engineers. I am a former member of Technical Association for Paper Chemicals -- TAPP. I have forgotten the exact title.

Q Are there any others?

A That's about it.

Q What does the Association of Lubrication Engineers do?

A It is a society that provides technical information and papers. They publish a technical journal on lubrication.

Q What is the nature of that journal?

A I think it is ALSE. I think there's two sides. One is a bimonthly publication. The other is transactions of meetings.

Q Have you ever attended any of their meetings?

A Some local meetings and on occasion a national meeting or two.

Q Are papers given at these meetings?

A Yes.

Q Do they discuss, what do they discuss at some of these meetings, the state of art of the machinery?

A Jet engine lubricants or wear, friction.

Q Have you ever received any awards at Monsanto for the work that you have done for the company?

A I have received bonus awards occasionally.

Q Have you ever received any awards from outside of the company for your technical work?

A No.

Q I believe you said from 1963 to 1974 you worked in the Organic Chemicals Division.

A I think I said I worked in the functional fluids. I also worked in the fluid's paper chemical area.

Q Could you tell me the time frames when you worked in each of those?

A I worked in functional fluids roughly from '63 to '74. I worked simultaneously in paper chemicals,

roughly '71 to '74.

Q You were the Manager of Research for functional fluids, is that correct?

A That is correct.

Q For the entire time that you were in the functional fluids group?

A That is right.

Q Were you also the Manager of Research for the paper products?

A Paper chemicals?

Q Paper chemicals.

A Yes.

Q What were the duties as Manager of Research for functional fluids?

A To organize the research effort on the products, markets that we were charted to serve.

Q Could you describe a little more fully what you mean by organize the research effort on the products and markets you were charted to serve?

A Well, you try to look ahead. You try to look ahead and see what product and problems would lie ahead for the particular function you are trying to serve. Then we make an effort to obtain budget, correct kind of budgets, correct kind of people,

technology and then hope that you could solve the problems that were posed by either you or your people or the organization providing that function.

Q Could you please tell me what products were marketed by the functional fluids group between 1963 and 1974?

A Skydrol, aviation hydraulic fluids; Pydraul, industrial hydraulic fluids, as far as listing hydraulic and lubricating fluid?

Q That is Pydraul?

A Pydraul, the trade name, served two areas: Air compressors and hydraulic fluids.

Q What about heat transfer?

A Yes.

Q Pydrauls were marketed --

A No.

Q What was --

A Heat transfer, well, Therminol. I thought maybe you'd give me the answer.

Q No.

A Therminol. This is number three after Pydraul and Skydrol.

Q Any others?

A Dielectric fluids.

Q What were their trade names?

MR. SCHINK: Are we talking about other than functional fluids?

MS. STEIN: Other than functional fluids, yes.

BY THE WITNESS:

A Our trade name was Aroclor.

Q But Aroclors were components of some of these others, weren't they?

A In the Pydraul.

Q Which Pydraul was it a component of?

A Was Aroclor a component of, is that the question?

Q Yes, that is the question.

A - F-9 and AC, 625, Pydraul 312, A200. We probably had some others somewhere in there.

Q The Aroclors that were a component of dielectric fluids, what was the trade name? Were there particular trade names for these dielectric fluids or were they Aroclors only?

A Other people had trade names but not Monsanto; Westinghouse, the generic name, I think was called Ascurals. GE had another, Pyrenol.

Q To whom did you report as Manager of Research for the functional fluids group?

A Anagnostopoulos.

Q What was his title?

A He was Director of Research.

Q For the --

A The Organic Division at that time.

Q Do you remember how long he held that job, what years he was in that position?

A No, I do not, not exactly.

Q Was it for the entire time you were Director of Research of Functional Fluids?

A There are so many organizations, I think the answer is no, but I don't think I can spell out exactly for you.

Q You have mentioned there were some reorganizations. Do you remember, I was asking you to go through some of these. If you want to draw them on a piece of paper to help, that would be fine, but let us start from 19- --

A The principal organizations were Organic Division was melded into the Inorganic Division to form the Industrial, Monsanto Industrial Division. And from that --

Q Do you remember?

A Process, this is what I can't remember. From

that Process Chemicals was the splitout and formed part of the Monsanto Intermediates Company.

Q Do you remember when that was?

A Around '76, I think. Those are the principal changes.

Paper Chemicals went to MPR at the same time Process Chemicals went to Intermediates Company.

Q It went --

A Went to Monsanto Polymer & Resins Company, MPR.

Q About 1966, you think?

A Yes. I don't have those dates firmly fixed.

Q In the Organic Division before it merged with the Inorganic Division, what were the groups inside the Organic Division?

You were the Manager for Research?

A At the functional fluids group.

Q What were some of the other groups?

A We had petroleum additives, we had paper.

Q Paper Chemicals?

A Paper Chemicals. They have Food and Fine.

Q Food and Fine?

A Food and Fine Chemicals.

We had plasticizers. We had rubber

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chemicals. Later they had flavors and fragrances.

Q Do you remember when that was?

A No.

Q What were the products of Food and Fine Chemicals?

A Typical ones were like aspirin, ascorbic acid.

Q Anything else that you can remember?

A We had vanillin, they had saccharin.

Q Anything else that you can think of?

A I can't think right now.

Q How about plasticizers? What were the products of the plasticizers group?

A They are built on phthlate esters, various kinds. They are built on adipate esters, built on phosphate esters.

Q Any PCBs?

A Yes. There were plasticizer applications, coatings.

Q Were there plasticizer applications for PCBs also?

A That is correct.

Q What were some of those plasticizer applications? Could you give me concrete examples, Dr. Richard?

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A I think they were used principally in the sealants.

Q For industrial machinery?

A No, I think for architectural.

Rubber-base paint.

Q Any adhesives of any kind?

A I think melt adhesives. I'm not very familiar with a melt adhesive's name.

Q Any kind of surface coatings in conjunction with the plasticizers?

A We didn't make surface coatings. We sold components to other in the surface coating game, so I don't know exactly how they were used.

Q In the Paper Chemicals Group, what were some of the products?

A Mersize.

Q What are some of the chemical components of that?

A Rosin, maleic anhydride in formulated sizes reacted with.

Q What other products?

A Monsize.

Q Is that a trade name?

A Both are trade names. Again, it is formulated

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sizing in dispersed form.

Q What were the names of the chemicals or the products that the Paper Chemicals Group produced that contained PCBs?

A I can't think of any.

Q Was the Paper Chemicals Group responsible for carbonless carbon paper?

A No.

Q Or components?

A Well, the plasticizer group actually was responsible, really.

Q Can you explain why that is?

A No, I guess historically it was that way, but that is the way it was. Plasticizers had it. It was transferred to, I guess, Specialty Chemicals.

Q Specialty Chemicals?

A Yes. I think that's what they called it, put the paper group and the functional fluids group together and called them Specialty.

Q Do you remember when that was?

A Early '70s.

Q Who did Mr. Anagnostopoulos report to?

A A string of General Managers. I guess Howard Minkler was the one for the longest time.

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Q Do you remember the years of his tenure? This was as a General Manager of the Organic Chemicals Division, is that correct?

A Yes. I don't have his.

Q What were the names of the other General Managers of the Organic Chemicals Division during the time that you were in that division?

A Bob Morris was the first. I think he was succeeded by Minkler.

Q Were there any others?

A I think not because I think it was merged into the MIC probably around the end of Minkler's term.

Q Then would the Director of Research for the Organic Division, would it no longer have been the Organic Division? Who would that person have reported to in the MIC?

A The MIC setup was a little different. The major emphasis was on business groups.

Q Business groups as opposed to product groups?

A As opposed to functional things like technology and/or manufacturing or marketing. There were things like business directors.

Q I think I would appreciate if you would make a chart that would show me what the organizational structure was after Monsanto, MIC was created.

A MIC was created from, we strayed from Organic and Inorganic Divisions. I have forgotten, that is the general scope of it. I think their first director was Cunningham. I think he was succeeded by Fitzgerald. I reported, I think he was called Managing Director. I reported to the General Manager, Lee Miller, and I was like the Director of R&D, Process Chemicals and Paper Chemicals.

Q During what years was that the structure?

A From the time MIC was formed until the thing was reorganized into the Intermediates Company, into what was, let's see, the Industrial Chemical was split apart. The Process Chemical went into the Intermediates Company. Whenever that date is, that is when Process Chemicals transferred to that function.

Q Could you draw me a chart showing the organizational structure prior to the creation of MIC?

A That was the organizational description I described.

Q Right, and how the various groups related to

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each other and to whom you reported and who had overall responsibility for the division.

A I said Minkler was the General Manager.

Q Do you have any idea what years he was the General Manager of the Organic Division?

A I said that I didn't know specifically, but from the time Morris left, Bob Morris.

Q Do you remember approximately when that was, mid-'60s?

A Yes.

Q Until?

A '65 or something like that, until whenever, and I don't know the date that MIC was formed. But he had functions, the General Manager had R&D which was Anagnostopoulos. I reported as part of the Research Department and they had Directors of Manufacturing and Marketing. That was the principal.

It had business directors and you have to the side, take the plasticizer group and rubber chemical group and paper group and each group had a business director.

Q Each of those product-related groups was headed by somebody called a business director?

A Yes. What he would do is you would have in

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R&D, have his say for functional fluids. You had a manufacturing manager, functional fluids; marketing manager for functional fluids, so we coordinated the business, if you will, of that particular part of the company.

Q So you had an overall R&D Director which was under Anagnostopoulos?

A Which was under Anagnostopoulos, yes.

Q And overall Manufacturing Director and overall Marketing Director and each of these product-related groups had under, the business director?

A It would be a manager, a manager would sit in the main staff.

Q And functional fluids then had a Manufacturing Director or Manager?

A There was a counterpart here, I think.

Q And the Marketing Manager or Director, is that correct?

A Yes.

Q Each of those groups had somebody with a manufacturing responsibility and another one, a marketing responsibility?

A Marketing responsibility, right.

Q For each of these groups, that was done?

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A Right.

Q Who was the Manufacturing Director or Manager?

A Manager.

Q Manager for Functional Fluids?

A I don't know for all the time, but Jim Savage was for a good part.

Q Who was the Marketing Director or Manager?

A Don Olson. Tom Gossage later.

MS. OLIVER: Tom Gossage?

THE WITNESS: Yes.

BY MS. STEIN:

Q Who was the Business Director for the Functional Fluids Group?

A The first was Wobers.

Q Do you remember approximately how long he was there?

A A few years.

Q Who succeeded Mr. Wobers?

A Mr. Creace, Jim Creace.

Q Who succeeded Mr. Creace?

A Howard Bergen.

Q And were all of these --

A Remember, we are starting, this is the Organic Division. And we are going to MIC during

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part of this time.

Q Who was the General Manager of the Organic Division again?

A I said Minkler, I think.

Q Who was in charge of the public relations function of the division or was anybody charged with the public relations function?

A There probably was. I don't recall.

Q How did Mr. Papageorge fit into this?

MR. SCHINK: When?

MS. STEIN: When he came to St. Louis.

BY THE WITNESS:

A He reported to Mr. Bergen. He was a business director and Mr. Papageorge was to head up, coordinate the Efforts and Environmental Concerns. He was to bring the marketing function and research function, manufacturing function and head that as a special assignment.

BY MS. STEIN:

Q He was supposed to be a coordinator among all of these various --

A Yes, dealing with the Government, the various agencies; within Monsanto as well, too, at least reporting to Bergen.

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Q Did you ever have any contacts outside of Monsanto relative to these environmental control procedures or these pollution control measures?

A I'm not sure of that question. I had some contacts with the FDA.

Q What were they in reference to?

A Looking for samples.

Q Of what?

A Aroclors.

Q Specific Aroclors?

A Yes.

Q Which ones?

A Glasgow, I think, asked for all the Aroclors and I think the terphenyls.

Q Who is Glasgow?

A A man in the FDA. I forget his exact title.

Q Do you know how it came about that he contacted you or did you contact him?

A No, he called me.

Q Did he tell you what had prompted his telephone call to you?

A No.

Q Did you ask?

A No, but Elmer Wheeler went to Washington and

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talked to Glasgow to try to find out why he wanted the samples.

Q Did you speak to Dr. Wheeler to find out?

A It is Mr. Wheeler.

Q Mr. Wheeler?

A Yes. I think he wanted them with regard to analytical methods.

Q Did you provide the FDA with these samples?

A Yes.

Q Do you remember when that was?

A Roughly 1968.

Q Was there anybody else? We talked about Mr. Anagnostopoulos. Was there anybody else who held the same position that he did during the time you were in the functional fluids group?

A When it was reorganized from the Organic, I think Dr. Roos, R-o-o-s, held that position.

Q This was after the reorganization to MIC?

A Yes, that is right.

Q Before that, do you remember who had the job or was it just the one person throughout the entire time?

A I would guess it was just Anagnostopoulos.

Q Were there ever meetings of the Managers

of Research among the various product groups in Monsanto?

A What do you mean?

Q Within the Organic Division?

A Within the Organic Division, did Anagnostopoulos hold joint meetings?

Q Yes, of all the research directors and product groups?

A Yes.

Q How frequently were those meetings held?

A At least once a month.

Q I would like you to go over with me, please, the history of how a product was conceived and developed and then put on the market, what the general process was.

A There is no one general process.

Q Give me, why don't we take as an example, you were there at the time Pydraul was developed, is that correct?

A Yes.

Q Why don't we use Pydraul 50E as an example then.

Who came up with the idea, what was done, were there tests done of any kind? If you

could go through the process, Dr. Richard.

A We decided that we wanted to develop a new fire-resistant hydraulic fluid.

Q What was the reason you wanted to develop a new fire-resistant hydraulic fluid?

A The reason was that we didn't want Aroclors out in the environment.

Q Can you pinpoint for me the date that you decided to begin developing this alternative fire-resistant hydraulic fluid?

A I think ideas are hard to pinpoint. In fact, they develop slowly over time, but I guess we have thought about phosphate esters as early as '66.

Q Had you used any phosphate esters in hydraulic fluids before 1966?

A Yes.

Q In which products?

A Pydraul F-9, for example.

Q Was Pydraul F-9 primarily a phosphate ester product?

A I have forgotten the exact composition. It had both Aroclor and phosphate esters in it, but we had been thinking about, and Skydrol of course was all phosphate esters, so it was not strange chemistry.

The drawbacks were that in Pydraul applications, they weren't fire-resistant as the Aroclors.

Q What was the difference?

A One of degree. We used to do a lot of fire tests and sprays on hot manifolds, and simulated aluminum pots, molten aluminum pots, and we would try to determine things like the ignition temperature and whether or not a spray would ignite under various conditions.

The other drawbacks of some of the phosphate esters had to do with temperature at which they could operate.

Q Is their range different from that of the Aroclors?

A The Arocloric fluids can operate at the highest temperatures and provided the most fire protection.

Q What was the range of temperature at which the phosphate esters, at least in 1966, were effective?

A You are talking about materials in the machine?

Q Yes, say ignition points.

A Oh, ignition points, I don't remember the numbers on these too well.

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I would say that the Aroclor fluids were roughly 200 degrees F. better, that order of magnitude kind of across the board.

Q Was this even after you developed the new --

A For example, the AITs are like 1100 and the others are maybe like 8 or 900, something like that.

Q Was that true after you developed a new phosphate ester hydraulic fluid, say Pydraul 50-E?

A Yes, it is an all phosphate ester and the problem is to build viscosity of high enough viscosity to make the right lubricant and build as much hydrolytic stability in it as you can, build as much temperature resistance and thermostability as you can.

Q Let us go back to the Pydraul 50-E.

Were you in charge of the development of that product?

A Yes.

Q Did the marketing people or somebody else come to you and ask you to develop this alternative fluid?

A It was a combination of the Research Department trying to stay out a little bit ahead in terms of what would be done, what might be done, try to answer questions, what if certain things happen. So

I would say that the initial part came from the Research Department but then with the research groups, we are sitting with the marketing and development, commercial development of the product, partly the product demand, so there was an interaction with the marketplace although it was indirect.

Q You came up with the idea that you wanted to develop a new fire-resistant hydraulic fluid, is that correct?

A Correct.

Q In approximately 1968, is that correct?

A I think I said the ideas probably started before that, but gathered impetus, and a little bit in '68 and took us further time to develop the ideas. And probably we didn't really get it really working until around '70, '69-70, somewhere in that range.

Q Who actually carried out the chemical research on the Pydraul? Can I have a name?

A You mean on the base stock?

Q Yes.

A There are two things that you have to do. You have to have a base stock and you have to formulate it to the right viscosity and you have to put often stabilizers or lubricity or various other components

in there to try to make it work in the function so that the base stock work was carried out by Herber, H-e-r-b-e-r, and Mr. Sullivan.

Q What were their titles?

A Probably John was a group leader.

Q Dr. Herber?

A Yes. Mr. Sullivan was a research chemist.

Q Were they working under your direction?

A Yes.

Q Was this in 1969?

A Again, I don't remember the dates, but probably '70, '71. I think we brought fluid out finally, got it into production anyway, in '72.

Q How long did it take to develop a base stock?

A A year or two.

Q Can you go through the process, did Dr. Herber and Mr. Sullivan come out with the results of their research?

A It is a combination of, I don't know how this one exactly developed, but chemists have to talk back and forth, usually in terms of we need this property, what kind of materials are there that will give us that property, what components have

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we got or has the marketplace got in production, people in production and can we make it in volume and do we have the proper catalyst to make the reaction go. Can we make the composition close enough to the viscosities that we need so it doesn't take major changes, major adjustments on the part of the formulation.

One of the things most difficult, the most difficult things in phosphate ester chemistry is to get the stability, the final necessary stability of the product, in other words, traces of acids but oftentimes --

Q Are you saying there are impurities or the phosphate esters would break down under certain stabilities?

A There might be traces of SCH and we start with a phosphoric oxychloride and SCH is given off in the reaction involved during the esterification. If you have small traces of nitrogen chloride creating that instability and metal alkyl attack, corrosion attack in terms of things like pump tests and stability against the metals.

Q In other words, what you are saying now are these are the criteria that you were using?

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A These are things that you, in making a base stock, the chemists and engineers have to worry about in terms of what process they use and what catalysts and temperatures and how to purify the material.

Q Are these same concerns present in the development of a base stock present for the development of all hydrochloric fluids?

A Each one is a little different. It depends on whether you are going from an alcohol or you are going from a phenol. There are times and temperatures and reactions that are different. The catalyst used to make the reaction go is often different.

Q Who determines which factors are more important than others?

A You try to reach, substantive research agreement to provide a process for manufacture.

Q Does the Research Department present a range of alternatives to the manufacturing people?

A Usually not. They have to give exact chemicals that do go in, exact catalysts and so forth and you set a specific range of raw material because products cannot be made exactly. You know, there is a variation in the raw materials but you try to make that variation so that it has minimal effect on

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the process.

Q Does the cost of raw materials enter into the calculation that you make?

A Yes, preliminary ones as to availability.

Q What were the specific characteristics that you were trying to achieve in the development of the Pydraul 50-E?

A We were trying to get a high enough viscosity, higher than tricresyl phosphate, for example, so we wouldn't have to use any thickening agent or VI improvers or things like that.

Q Why were you trying to avoid using these?

A Well, VI improvers tend to break down in time so the viscosity in the pump or hydraulic system changes and that is in general undesirable.

We wanted to build a thermostability. We wanted to build biodegradability. We wanted to build as much fire-resistance as we could and we wanted to build fire-resistance against phenolics.

Q What does that mean?

A In use, we didn't want the material to break down into phenol, give off phenols.

Q Why is that?

A I think the chief driving force was General

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Motors had some rigid specifications and I think, I don't know exactly when, but discharge of phenols was prohibited. I shouldn't say prohibited, but had to be kept below a certain level.

We didn't want phenol build-ups in the hydraulic equipment, a sign of instability.

Q What were the effects?

A You might get into lubrication problems, might get into corrosion problems.

Q What were the other characteristics? Were there any others that you remember?

A We obviously wanted as much safety as we could get in the product from the standpoint of things like skin absorption, toxicity; for example, feeding animals as far as animals went.

Q When does toxicity testing enter into the picture?

A Early in the game.

Q Let us talk about Pydraul 50-E.

A Yes. You have to work with the Medical Department in developing a new chemical.

Q Did all of the product groups work with the Medical Department when they were developing new products?

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A Yes. It was always a function of I think Monsanto, to run medical tests on the products, and certainly the number of tests run began to increase as time went on.

Phosphate esters, another thing we were trying to avoid was neurotoxicity of certain phosphate esters tested in chickens of neurological problems.

Q Did Monsanto conduct those tests?

A Monsanto, I don't think did, but they had outside laboratories that ran these tests.

You see, we were trying to avoid, wanted to avoid any neurotoxic effect.

Q Was that in conjunction with this product that those tests that were run that these neurological impacts on chickens showed up?

A It didn't show up on these products but we wanted to be aware that they didn't show up. I think they call it chickadema.

Q Does the Research Department ever do toxicity testing, did the Research Department do toxicity testing on Pydraul 50-E itself?

A No, not directly. The Medical Department always ran a screen of acute toxicity tests, just

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from their own budgets. We would fill out papers and they would run it, then a consultation with one or more members of the Medical Department, decide what additional tests had to be run and that depended upon the function of the product and the exposure they expected of it and what it was supposed to do.

So they did a special set of tests that normally had to be run outside and the budget for those had to be funded by the particular product group in question, but the Medical Department would specify the tests and in general would oversee those tests.

Q These are the ones done by the outside?

A Yes, which I oversaw.

Q Did you oversee the tests at all?

A On occasion, I visited Industrial Bio-Test Laboratories, but not in the role of overseer.

Q What role?

A To find out what the protocols were and on occasion to see how their results were, but not in a primary authority role; to consult with people running the tests on occasion.

Q I'm a little confused.

You indicated the Medical Department

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WATER_PCB-SD0000022178

specified what the tests were.

A Yes, in conjunction with the Chemistry and Research Department. We would tell them that is a Pydraul fluid, this is the composition, this is the intended use, and they would say okay, we think you ought to run this, that and the next thing.

You should be careful here though. There would be, we would say, oh, all right. We think we have the right purity and these impurities out of it and structure looks like this and that the structure should be all right, but we better go ahead and test A, B, C, D, E, and F and so forth.

Q Who determined, was it the Medical Department who was responsible for establishing the test methodology to be performed?

A The protocols outside?

Q Yes.

A In conjunction with the outside testing agency but the ultimate of what they ordered would be from the Medical Department.

Q Did you have any role in developing these protocols?

A No.

Q Did any one of your departments have a role

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in that?

A Research, R&D might listen, but we don't know that much about toxicology tests to know how many rats, exactly how to examine and feed them and so forth.

Q Did you have any responsibility for asking whether there should be chronic toxicity testing as well as acute toxicity testing?

A Yes, I'd say that was a partial role here, but not the primary role.

Q Did you suggest chronic toxicity tests as well as acute toxicity tests for Pydraul 50-E?

A I don't know specifically what tests were carried out for Pydraul 50-E. I know we did a lot of work on chickadema, for example. I don't know if you would consider that chronic, I suppose it is.

Q Who was responsible in the Medical Department for specifying which tests were to be carried out with respect to a particular proposed product?

A I think it depended on who was assigned to cover what areas.

Q Were the people in the Medical Department assigned to particular product groups?

A Yes.

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Q Who was assigned to the functional fluids group?

A I think Wheeler had for the longest period. We had a man named Hunt, Bill Hunt, carry out all our storage, ran acute toxicity tests, kept track of that as a function. I think Dr. Kelly was involved at OD and I don't know when George Rousch came aboard, but obviously he was in charge when Kelly retired; Robert Levinskas.

Q Let me make sure of this, Dr. Richard.

If a product was proposed, take the case of Pydraul 50-E, it was taken to the Medical Department?

A We had to fill out the forms, for example, on the physical properties, on the structure and on the intended use and so forth, and then an acute screen was run.

Q In-house?

A No.

Q By the Medical Department?

A No, normally by Younger Labs, but that was Hunt's function. I don't know who took over. He died and I don't know who took over.

Then we would sit down with them and

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decide what additional testing should be done.

Q Based on the work that had been done by Younger Labs?

A Based on a part on that and part of the structure and part of the intended use.

Q Who analyzed the results of the acute toxicity tests that were done?

A Hunt would send back reports.

Q To whom did these reports go?

A I don't know. We had a standard distribution. I was on one of them; probably the chemist or the group leader involved, and it probably went to the person who had that assigned group, probably went to Kelly, I don't know.

Q Did it go to any of the marketing people?

A It might have, but chances are better that the normal detail stuff, the acute, sometimes it was enough and sometimes maybe a little more would be required.

Q Who made the determination as to whether this initial testing by Younger Labs on acute toxicity was sufficient for the purposes of introducing a product?

A This fell to the Medical Department.

Q Did they instruct anybody else as to whether or not more testing should not or should be done?

A Sometimes they hired consultants.

Q Did they hire a consultant on Pydraul 50-E?

A I can't be sure on that. My best guess is --

MR. SCHINK: You don't have to guess.

BY THE WITNESS:

A I can't be sure.

BY MS. STEIN:

Q The determination as to whether or not further testing would be done, were there ever consultations with you?

A Yes.

Q Were there consultations on Pydraul 50-E as to whether or not further testing was required?

A I'm sure that first submissions, probably in developing the fluid, not the final formulation, but I'm sure we went through a series of tests on the different components and on the different possible compositions and formulations.

Q What were the criteria that were used to evaluate the test results that came back from Younger Labs?

MR. SCHINK: If you know.

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BY THE WITNESS:

A There is a standard set of toxicology descriptions, depending upon how the standard tests come out, and there were also numerical values given.

BY MS. STEIN:

Q Are you familiar with those standards?

A Not right now, no.

Q Were you ever?

A When I had them in front of me, I was using them all the time, I guess I could quote them.

Q When was that?

A I'd say when I was in the fluids business, probably saw things about poison and various degrees of toxicity which were used.

Q From approximately 1963 to approximately 1974 you would have worked with those on a regular basis?

A Well, I would have worked on a part-time basis because the principal interpretation is up to the Medical Department. What I say about toxicity doesn't cut any ice. The only thing I would read was whether our chemistry, whether we had to keep going or whether we probably could satisfy it.

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:5

(Whereupon, at 12:40 o'clock:
p.m., a lunch recess was
taken to 1:15 o'clock p.m.,
this same day.)

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